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EXAMINER	
GERSTL, SHANE F	

ART UNIT	PAPER NUMBER
2183	8

DATE MAILED: 03/04/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/833,653	KAMITANI ET AL.	
	Examiner	Art Unit	
	Shane F Gerstl	2183	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 July 2001 and 13 April 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9, 11-17, and 19-20* is/are rejected.

7)☒ Claim(s) *10 and 18* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *13 April 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *3 and 6*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-20 have been examined.

Papers Received

2. Receipt is acknowledged of *** paper* submitted, where the paper* has/have been placed of record in the file.

Drawings

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: 96A and 96B. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

4. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: 83-88. A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

5. The drawings are objected to because on page 14, the reference sign 82 has been used to denote the 0^{th} DATA element of figure 15 and the figure shows reference sign 82 to be the 6^{th} DATA element. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

6. The drawings are objected to because Figure 1 makes it appear as though line 4 and the line between elements 2 and 3 are the same lines due to the names. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

7. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: Execution Control Apparatus of Data Driven Processor For Instructions With 1 to N Inputs.

Allowable Subject Matter

8. Claims 10 and 18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. When the number of inputs is N+2, this means that the number of inputs is 3 or more depending on N. The prior art of record does not specifically teach a dataflow processor where when the number of inputs is 3 or more, the constant flag is set to an invalid state and the number of instruction inputs is set to N+1 where these new values are then output to the waiting processing unit. In addition, no prior art of record suggests that it would have been obvious to one of ordinary skill in the art at the time of invention to modify the prior art of record wherein when the number of inputs is 3 or more, the constant flag is set to an

invalid state and the number of instruction inputs is set to N+1 where these new values are then output to the waiting processing unit.

Claim Objections

9. Claims 1 and 13 are objected to because of the following informalities: line 25 of claim 1 and lines 24 and 42 of claim 13 state the phrase "...predetermined ways of processes for waiting data..." which is a grammatically incorrect and unclear statement. The examiner is taking the claim to instead read, "...predetermined ways of processing waiting data..." in order to correct the grammatical error and not change the scope of the claim.

10. Claim 4 is objected to because of the following informalities: the claim refers to "each packet," but, the examiner would prefer for the claim to read "each input packet" in order to stay consistent with claim 1 and avoid any confusion.

11. Claim 13 is objected to because of the following minor informalities: line 23 refers to "a packet" but the examiner would prefer for the claim to read "an input packet" in order to stay consistent with the claim language and avoid any confusion

Appropriate correction is required.

Claim Rejections - 35 USC § 112

12. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

13. Claims 1-12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

14. Claims 1 and 13 recites the limitation "an input packet" in line 20. There is insufficient antecedent basis for this limitation in the claim. There has already been an input packet defined and the examiner cannot determine whether it was meant to refer to the same input packet or a different one. The examiner is taking the limitation to read, "the input packet" so as to refer to the predefined instance as would makes sense in the context. Similarly, line 24 recites the limitation "the input packet" which has been rendered indefinite because of the aforementioned related problem. If there are two input packets meant to be defined then one cannot tell which is being referred to. With the examiner taking the previous limitation to be as stated above, the limitation "the input packet" is being interpreted as originally written because it is then clear as to what input packet is being referred to.

15. Claims 1 and 13 recites the limitation "each address" in line 17. There is insufficient antecedent basis for this limitation in the claim. Line 15 states that the constant storage device stores *a* (one) constant, but line 17 refers to multiple addresses for multiple constants. The examiner is taking the claim to read "a plurality of constants" in line 15 as taught in the specification.

16. Claims 1 and 13 recites the limitation "the relevant address" in line 21. There is insufficient antecedent basis for this limitation in the claim. There has been no "relevant address" defined up to this point. The examiner is taking the claim to read "a relevant address."

17. Claim 13 recites the limitation "a packet" in line 23. There is insufficient antecedent basis for this limitation in the claim. There has already been a packet or

input packet previously defined in the claim and the examiner is unable to tell if the claim means to refer to that packet or a new one. The examiner is taking the claim to read, "the input packet" according to the specification.

Claim Rejections - 35 USC § 102

18. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

19. Claims 1, 6-9, 12-13, 17, and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Yumoto (5,640,525).

20. In regard to claim 1, Yumoto discloses an execution control apparatus of a data driven information processor, wherein a handled instruction includes N+2 (N is an arbitrary integer of at least 1) inputs at most, and one of the inputs is a constant when an instruction has N+2 inputs; Yumoto uses 1 or 2-inputs for instructions as shown in column 10, lines 43-45. Since the claim reads that N+2 inputs at most, this means a minimum of 3 inputs at most with N=1. The language "at most" simply requires that a reference teach an embodiment with no more than the disclosed number. Therefore, Yumoto's 1 and 2 input scheme meets the limitation of at most N+2 inputs. The second section of this wherein clause ("...one of the inputs is a constant...") has no support in the body of the claim. There is mention of constant data but no mention that the constants are used as inputs. Because of this and the fact that the section is in a

wherein clause, the examiner is not required to give patentable weight to this section of the claim. See MPEP 2106.

Said execution control apparatus comprising:

a. an instruction decoder that decodes an instruction in an input packet and outputs the number of inputs required for said instruction; Column 3, lines 27-31 shows that the packet is analyzed by an instruction execution packet detection unit (decoder) and it is determined whether the instruction is a 1 or 2-input instruction. It is shown here that a flag indicating the result of this determining (the number of inputs) is output.

b. a waiting storage region including

i. a waiting data storage region that can store N waiting data in one address,

ii. and a data valid flag storage region indicating whether that stores a data valid flag for each address, said data valid flag the N waiting data stored in said address are respectively valid or invalid;

Column 4, lines 16-22 and figures 11 and 12 show a matching memory (waiting storage region) that stores data at addresses that includes a region (PRE flag) that indicates whether the data is valid or invalid. Since is any integer greater than or equal to one, with N equal to one, each address has a corresponding piece of data.

c. a constant storage device including

i. a region that stores a constant,

ii. and a constant valid flag storage region that stores a constant valid flag representing whether a constant stored in each address is valid or invalid;

Column 6, lines 32-40 and figure 20 show a constant data memory (storage device) that stores constant data with a region for storing a valid flag that tells if each constant is valid or invalid.

d. a constant readout unit that accesses said constant storage region according to address information included in an input packet to read out a constant and a constant valid flag from the relevant address in said constant storage region (Column 6, lines 32-40);

e. a waiting operation determination unit (column 7, lines 11-12, data pair generation mechanism: interleave flag, address generation circuit, and data select circuit) that

i. determines an address by hash calculation from contents of the input packet; The address generation circuit inherently generates or determines an address. Column 4, lines 5-9 show that data from memory and the packet are checked for hash collision. This means that addresses must be generated by a hash calculation.

ii. selects one of a plurality of predetermined ways of processing waiting data; Column 7, lines 12-15 shows that one of a plurality if mechanisms for generating data is selected.

iii. outputs a select signal depending upon a combination of a data valid flag for said determined address, a constant valid flag read out by said constant readout unit, and the number of instruction inputs output from said instruction decoder for said waiting storage region; Column 4, lines 24-35 show that a packet is output based on the number of inputs and a valid flag for data from the matching memory. Column 11, lines 44-47 shows that the selection is based off of a VLD flag (shown in column 10, lines 20-22 to be the valid flag of the constant) as well.

iv. and updates the data valid flag for said address based on the selected result; Column 4, lines 31-35 show that the valid data flag (PRE) is updated.

f. and a waiting region access unit being responsive to said select signal to implement a waiting process corresponding to said select signal. Column 7, lines 20-26, shows a data select circuit (waiting region access unit) operates the said mechanisms from above based on the token received from the unit above.

21. In regard to claim 6, Yumoto discloses the apparatus according to claim 1, wherein N of said data valid flags are prepared for one address. Figure 11 and 12 show that the data valid flags (PRE flags) are prepared for one address.

22. In regard to claim 7, Yumoto discloses the apparatus according to claim 6, wherein

a. each data valid flag is prepared of one bit for one waiting data of one address; Figures 11 and 12 show that each PRE flag associated with one

address. As shown above, the PRE flag indicates whether data is valid (PRE=1) or invalid (PRE=0) and as can be noted from the rest of Yumoto's disclosure, these are the only two values of this flag. Thus the valid flag is one bit.

b. and said data valid flag storage region includes N flip-flop circuits for each address, each flip-flop circuit storing a data valid flag of one bit. Figures 9 and 29 show the matching memory (waiting data storage region), 284. The figures show the memory to have D inputs (DI) and outputs (DQ) for a specified address given on the A input. One of ordinary skill in the art would recognize this to mean that the storage area comprises D flip-flops for each address. Since each address has one valid flag associated with it, each flag is stored in a D flip-flop.

23. In regard to claim 8, Yumoto discloses the apparatus according to claim 1, wherein said data valid flag storage region includes an erasable storage circuit that clears the region in response to a reset signal. Column 4, lines 10-19 show that the valid flag is invalidated or cleared to zero. This means that there is an erasable storage circuit that performs this function. Since this updating or clearing is only done at a certain point, it is in response to a signal, which can be called a reset signal.

24. In regard to claim 9, Yumoto discloses the apparatus according to claim 8, wherein each of data valid flag is prepared of one bit for one waiting data of one address, and said erasable storage circuit includes a D flip-flop circuit for each address, each D flip-flop circuit storing a data valid flag of one bit. As shown above, the PRE flag indicates whether data is valid (PRE=1) or invalid (PRE=0) and as can be noted from the rest of Yumoto's disclosure, these are the only two values of this flag. Thus the

valid flag is one bit. Figures 9 and 29 show the matching memory (waiting data storage region), 284. The figures show the memory to have D inputs (DI) and outputs (DQ) for a specified address given on the A input. One of ordinary skill in the art would recognize this to mean that the storage area comprises D flip-flops for each address. Since each address has one valid flag associated with it, each flag is stored in a D flip-flop.

25. In regard to claim 12, Yumoto discloses the apparatus according to claim 1, wherein N=1. With N=1, a handled instruction has at most 3 inputs and the waiting data storage holds 1 piece of data for each address. As described above, the disclosure of Yumoto has 1 and 2 inputs which meets the limitation of at most 3 inputs. Also as shown above and in figures 11 and 12, each address holds one piece of data.

26. In regard to claim 13, Yumotot discloses an execution control method of a data driven information processor, wherein a handled instruction includes N+2 (N is an arbitrary integer of at least 1) inputs at most, and one of the inputs is a constant when an instruction has N+2 inputs, said data driven information processor comprising: Yumoto uses 1 or 2-inputs for instructions as shown in column 10, lines 43-45. Since the claim reads that N+2 inputs at most, this means a minimum of 3 inputs at most with N=1. The language "at most" simply requires that a reference teach an embodiment with no more than the disclosed number. Therefore, Yumoto's 1 and 2 input scheme meets the limitation of at most N+2 inputs. The second section of this wherein clause ("...one of the inputs is a constant...") has no support in the body of the claim. There is mention of constant data but no mention that the constants are used as inputs.

Because of this and the fact that the section is in a wherein clause, the examiner is not required to give patentable weight to this section of the claim. See MPEP 2106.

a. an instruction decoder that decodes an instruction in an input packet to output the number of inputs required for said instruction; Column 3, lines 27-31 shows that the packet is analyzed by an instruction execution packet detection unit (decoder) and it is determined whether the instruction is a 1 or 2-input instruction. It is shown here that a flag indicating the result of this determining (the number of inputs) is output.

b. a waiting storage region including

i. a waiting data storage region that can store N waiting data in one address,

ii. and a data valid flag storage region that stores a data valid flag for each address, said data valid flag indicating whether the N waiting data stored in said address are respectively valid or invalid;

Column 4, lines 16-22 and figures 11 and 12 show a matching memory (waiting storage region) that stores data at addresses that includes a region (PRE flag) that indicates whether the data is valid or invalid. Since is any integer greater than or equal to one, with N equal to one, each address has a corresponding piece of data.

c. a constant storage device including

i. a region that stores a constant,

ii. and a constant valid flag storage region that stores a constant valid flag representing whether a constant stored in each address is valid or invalid;

Column 6, lines 32-40 and figure 20 show a constant data memory (storage device) that stores constant data with a region for storing a valid flag that tells if each constant is valid or invalid.

d. a constant readout unit accessing said constant storage region with a node number of an input packet as an address to read out a constant and a constant valid flag from the relevant address in said constant storage region (Column 6, lines 32-40);

e. a waiting operation determination unit (column 7, lines 11-12, data pair generation mechanism: interleave flag, address generation circuit, and data select circuit) that

i. determines an address by hash calculation from contents of a packet, The address generation circuit inherently generates or determines an address. Column 4, lines 5-9 show that data from memory and the packet are checked for hash collision. This means that addresses must be generated by a hash calculation.

ii. selects one of a plurality of predetermined ways of processes for waiting data, Column 7, lines 12-15 shows that one of a plurality if mechanisms for generating data is selected.

iii. outputs a select signal corresponding to a combination of a data valid flag for said determined address, a constant valid flag read out by said constant readout unit, and the number of instruction inputs output from said instruction decoder for said waiting storage region, Column 4, lines 24-35 show that a packet is output based on the number of inputs and a valid flag for data from the matching memory. Column 11, lines 44-47 shows that the selection is based off of a VLD flag (shown in column 10, lines 20-22 to be the valid flag of the constant) as well.

iv. and updating the data valid flag for said address based on the selected result; Column 4, lines 31-35 show that the valid data flag (PRE) is updated.

f. and a waiting region access unit being responsive to said select signal to implement a waiting process corresponding to said select signal; Column 7, lines 20-26, shows a data select circuit (waiting region access unit) operates the said mechanisms from above based on the token received from the unit above.

said method comprising the steps of:

g. decoding an instruction, wherein an instruction in an input packet is decoded by said instruction decoder, and the number of inputs required by the instruction is output; Column 3, lines 27-31 shows that the packet is analyzed by an instruction execution packet detection unit (decoder) and it is determined whether the instruction is a 1 or 2-input instruction. It is shown here that a flag indicating the result of this determining (the number of inputs) is output.

h. reading out a constant, wherein said constant storage region is accessed based on address information included in the input packet, and a constant and a constant valid flag are read out from a relevant address in said constant storage region; Column 6, lines 32-40 shows all of this including that address information is gotten from the destination information of the instruction token.

i. determining a waiting process, wherein

i. an address is determined by hash calculation from contents in the packet; Column 7, lines 11-12 show an address generation circuit for determining an address. Column 4, lines 5-9 show that data from memory and the packet are checked for hash collision. This means that addresses must be generated by a hash calculation.

ii. one of a plurality of predetermined ways of processes for waiting is selected, Column 7, lines 12-15 shows that one of a plurality if mechanisms for generating data is selected.

iii. a select signal is output corresponding to a combination of a data valid flag for said address, a constant valid flag read out from said constant readout unit, and the number of instructions output from said instruction decoder for said waiting storage region; Column 4, lines 24-35 show that a packet is output based on the number of inputs and a valid flag for data from the matching memory. Column 11, lines 44-47 shows that the selection is based off of a VLD flag (shown in column 10, lines 20-22 to be the valid flag of the constant) as well.

iv. and the data valid flag is updated corresponding to said address based on the selected result; Column 4, lines 31-35 show that the valid data flag (PRE) is updated.

j. And executing the waiting process, wherein, in response to said select signal, a waiting process corresponding to said select process is performed. Column 7, lines 20-26, shows a data select circuit (waiting region access unit) operates the said mechanisms from above based on the token received from the unit above.

27. In regard to claim 17, Yumoto discloses the apparatus according to claim 13, wherein said data valid flag storage region includes an erasable storage circuit clearing the region in response to a reset signal, said method further comprising the step of applying a reset signal to said storage circuit, thereby clearing said data valid flag storage region. Column 4, lines 10-19 show that the valid flag is invalidated or cleared to zero. This means that there is an erasable storage circuit that performs this function. Since this updating or clearing is only done at a certain point, it is in response to a signal, which can be called a reset signal.

Claim Rejections - 35 USC § 103

28. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

29. Claims 2-5 and 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yumoto in view of Choquette (6,530,011).

30. In regard to claim 2,

a. Yumoto discloses the apparatus according to claim 1,

b. Yumoto does not disclose the apparatus

i. wherein said constant storage region includes a first constant storage region that stores constant data of a first type, and a second constant storage region that stores constant data of a second type,

ii. wherein said constant readout unit identifies whether the readout constant is of said first type or said second type according to the address. Yumoto does disclose, as shown above, a constant readout unit for reading constant values from a constant storage region.

c. Choquette has disclosed a constant storage region including a first constant storage region that stores constant data of a first type, and a second constant storage region that stores constant data of a second type; Column 4, lines 62-65 show a register file (constant storage region) that contains two sets of register banks (first and second constant storage region) that holds two different types of constant data, vector and scalar data. Since the constant readout unit disclosed by Yumoto reads the constant data out from the constant storage region, when the dual-type constant storage region of Choquette is used with the disclosure of Yumoto, this constant readout unit it would inherently identify whether a constant is of the first type or second type (according to the register

bank and thus the address) since, as shown in column 1, lines 16-24 of Choquette, the two types are represented differently and treated differently.

d. Choquette has shown in column 1, lines 43-46 that using vectors improves system performance for data accesses and computations. This improved performance would have motivated one of ordinary skill in the art to modify Yumoto to use vectors and store them in the manner disclosed by Choquette.

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the design of Yumoto to include the use of vectors and store them in the manner disclosed by Choquette so that system performance is improved.

31. In regard to claim 3, Yumoto in view of Choquette has disclosed the apparatus according to claim 2, wherein said constant data of the first type is a scalar constant, and said constant data of the second type is a vector constant, as shown above.

32. In regard to claim 4, Yumoto in view of Choquette has disclosed the apparatus according to claim 3, wherein each packet can store plurality of data, and said waiting operation determination unit can store a plurality of data for each packet. Figures 14 and 15 show the format of data packets (column, 9, lines 10-13) and it can be seen that the data packets store a plurality of data via each field in the packet. Since no type or use of the data was specified in the claim, this is sufficient to meet this data limitation of the claim. Column 6, lines 66-67 shows that the above described matching memory, which stores a plurality of waiting data for the packets, is included with the data pair generation mechanisms (waiting operation determination unit).

33. In regard to claim 5,

a. Yumoto in view of Choquette, as described above, has disclosed the apparatus according to claim 2, wherein said constant data of the first type is a scalar constant of a first length, and said constant data of the second type is a constant of a second length different from said first length. Figure 3, shows that the double precision scalar data is if a different length than the single precision vector data.

b. Yumoto in view of Choquette, as described above, does not disclose the apparatus wherein said constant data of the second type is a scalar constant of a second length different from said first length.

c. Choquette does disclose, as seen in figure 3, a second scalar constant type of a double precision word length.

d. Choquette has shown in column 8, lines 28-33 that calculations use both single and double precision data interchangeably when necessary. This allows for great flexibility in the type of calculations that may be performed since two data types are used. This flexibility of execution would have motivated one of ordinary skill in the art to modify the design of Yumoto in view of Choquette to include the use of two scalar data types of different lengths as taught by Choquette.

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the design of Yumoto in view of Choquette to include the use of two different scalar data types and lengths as taught by Choquette so that greater flexibility in execution is attained.

34. In regard to claim 14,

a. Yumoto discloses the method according to claim 13,

b. Yumoto does not disclose the method

i. wherein said constant storage region includes a first constant storage region that stores constant data of a first type, and a second constant storage region that stores constant data of a second type,

ii. wherein said step of reading out a constant includes the steps of:

(1) determining whether the readout constant is of said first type or said second type based on the address.

(2) And reading out the constant.

Yumoto does disclose, as shown above, a constant readout unit for reading constant values from a constant storage region.

c. Choquette has disclosed a constant storage region including a first constant storage region that stores constant data of a first type, and a second constant storage region that stores constant data of a second type; Column 4, lines 62-65 show a register file (constant storage region) that contains two sets of register banks (first and second constant storage region) that holds two different types of constant data, vector and scalar data. Since the constant readout unit disclosed by Yumoto reads the constant data out from the constant storage region, when the dual-type constant storage region of Choquette is used with the disclosure of Yumoto, this constant readout unit it would inherently identify whether a constant is of the first type or second type (according to the register

bank and thus the address) since, as shown in column 1, lines 16-24 of Choquette, the two types are represented differently and treated differently.

d. Choquette has shown in column 1, lines 43-46 that using vectors improves system performance for data accesses and computations. This improved performance would have motivated one of ordinary skill in the art to modify Yumoto to use vectors and store them in the manner disclosed by Choquette.

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the design of Yumoto to include the use of vectors and store them in the manner disclosed by Choquette so that system performance is improved.

35. In regard to claim 15, Yumoto in view of Choquette has disclosed the method according to claim 14, wherein said constant data of the first type is a scalar constant, and said constant data of the second type is a vector constant, as shown above.

36. In regard to claim 16,

a. Yumoto in view of Choquette, as described above, has disclosed the apparatus according to claim 14, wherein said constant data of the first type is a scalar constant of a first length, and said constant data of the second type is a constant of a second length different from said first length. Figure 3, shows that the double precision scalar data is if a different length than the single precision vector data.

b. Yumoto in view of Choquette, as described above, does not disclose the method wherein said constant data of the second type is a scalar constant of a second length differing from said first length.

c. Choquette does disclose, as seen in figure 3, a second scalar constant type of a double precision word length.

d. Choquette has shown in column 8, lines 28-33 that calculations use both single and double precision data interchangeably when necessary. This allows for great flexibility in the type of calculations that may be performed since two data types are used. This flexibility of execution would have motivated one of ordinary skill in the art to modify the design of Yumoto in view of Choquette to include the use of two scalar data types of different lengths as taught by Choquette.

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the design of Yumoto in view of Choquette to include the use of two different scalar data types and lengths as taught by Choquette so that greater flexibility in execution is attained.

37. Claims 11 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yumoto in view of Hennessy.

38. In regard to claim 11,

a. Yumoto discloses the apparatus according to claim 13, and to a certain extent wherein N=2. With N=2, a handled instruction has at most 4 inputs and the waiting data storage holds 2 pieces of data for each address. As described above, the disclosure of Yumoto has 1 and 2 inputs which meets the limitation of at most 4 inputs.

b. Yumoto does not disclose that 2 pieces of data are stored for each address in the waiting data storage region as is the case when N=2.

c. Hennessy teaches on pages 429-431, a manner of interleaving memory. It is shown that multiple reads or writes occur with this type of memory design. An address is sent to multiple banks where the multiple stored data is manipulated. Therefore, a memory storage system is disclosed that describes storing two pieces of data for each address.

d. This ability to read or write multiple words at a time gives a performance boost that would have motivated one of ordinary skill in the art to modify the design of Yumoto to include the memory interleaving design disclosed by Hennessy.

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the design of Yumoto to include the interleaved memory design taught by Hennessy so that memory performance may be increased.

39. In regard to claim 19,

a. Yumoto discloses the method according to claim 1, and to a certain extent wherein N=2. With N=2, a handled instruction has at most 4 inputs and the waiting data storage holds 2 pieces of data for each address. As described above, the disclosure of Yumoto has 1 and 2 inputs which meets the limitation of at most 4 inputs.

b. Yumoto does not disclose that 2 pieces of data are stored for each address in the waiting data storage region as is the case when N=2.

c. Hennessy teaches on pages 429-431, a manner of interleaving memory. It is shown that multiple reads or writes occur with this type of memory design. An address is sent to multiple banks where the multiple stored data is manipulated. Therefore, a memory storage system is disclosed that describes storing two pieces of data for each address.

d. This ability to read or write multiple words at a time gives a performance boost that would have motivated one of ordinary skill in the art to modify the design of Yumoto to include the memory interleaving design disclosed by Hennessy.

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the design of Yumoto to include the interleaved memory design taught by Hennessy so that memory performance may be increased.

Conclusion

40. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following references have been cited to further show the art with respect to multiple input dataflow processors in general.

US Pat No 6,038,656 to Martin shows a dataflow processor that uses instructions with up to 4-inputs.

"An Advanced Dataflow Processor Architecture Based on a Multiple Input Node Concept" by Kuru teaches a dataflow processor that accepts up to 4 token packets at a time.

"High Performance Single Chip Data Flow Processor" to Kuru also teaches a dataflow processor that accepts up to 4 token packets at a time.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shane F Gerstl whose telephone number is (703)305-7305. The examiner can normally be reached on M-F 6:45-4:15 (First Friday Off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Chan can be reached on (703)305-9712. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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February 25, 2004

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